



## Practical Cost-Estimating and Validation Lessons-Learned Workshop Cost-Estimating Terms and Definitions

**Activity** A task or element of work that takes place in a specific period of time and that is required to complete a project.

**Activity-Based Costing** A cost estimating method utilized when the project is divided into discrete, defined activities; a cost estimate is prepared for each activity.

**Activity Data Sheet** The activity data sheet (ADS) Supports the Environmental Restoration Planning, Budget, and Control System and relates to the program summary work breakdown structure (WBS) at a specific level.

**Administration** Salaries, travel, and other expenses for the overall administration personnel (e.g., office manager) of the project. This is an indirect cost.

**Allowance** Additional resources included in estimates to cover the cost of known but undefined requirements for an individual activity, work item, account, or subaccount. An “estimate” allowance is an educated but somewhat arbitrary forecast of cost that is to be included in the totals in a cost estimate and is used as a basis to adjust or modify a contract if the actual cost is different than the stated allowance.

**Analogy Estimate** An estimate prepared by using data from a similar project. Usually a rough order-of-magnitude estimate.

**As Low As reasonably Achievable (ALARA)** A radiation protection principle applied to hazardous materials or radiation exposures, with costs and benefits taken into account.

**Baseline** A comprehensive time-phased plan consisting of assigned controlled budgets (totaling the TEC), against which contract performance is measured in dollars. The baseline is further identified as a quantitative definition of cost, schedule, and technical performance that serves as a base or standard for measurement and control during the performance of an effort; the established plan against which the status of resources and the effort of the overall program or project activities are measured, assessed, and controlled.

**Benefits** Personnel benefits; Social Security, worker’s compensation and disability insurance, sick leave, holidays and vacation, life insurance, hospitalization programs, pension with similar benefits, etc.

**Best And Final Offer (BAFO)** The act of providing a revised bid based on the latest requirements and conditions of the requestor.

**Budget Authority (BA)** Authority provided by law to enter into financial obligations that will result in immediate or future outlays involving federal government funds. Budget authority includes the credit subsidy cost for direct loan and loan guarantee programs but does not



include authority to ensure or guarantee the repayment of indebtedness incurred by another person or government. The basic forms of budget authority include (1) appropriations, (2) borrowing authority, (3) contract authority, and (4) authority to obligate and expend offsetting receipts and collections. Budget authority may be classified by its duration (1-year, multiple-year, or no-year), by the timing of the legislation providing the authority (current or permanent), by the manner of determining the amount available (definite or indefinite), or by its availability for new obligations.

**Budget Outlay (BO)** The issuance of checks, disbursement of cash, or electronic transfer of funds made to liquidate a federal obligation. Outlays also occur when interest on the Treasury debt held by the public accrues and when the government issues bonds, notes, debentures, monetary credits, or other cash-equivalent instruments in order to liquidate obligations. Also, under credit reform, the credit subsidy cost is recorded as an outlay when a direct or guaranteed loan is disbursed.

Outlays during a fiscal year may be for payment of obligations incurred in prior years (prior-year obligations) or in the same year. Outlays, therefore, flow in part from unexpended balances of prior-year budgetary resources and in part from budgetary resources provided for the year in which the money is spent. Outlays are stated both gross and net of offsetting collections.

**Buried Contingency** Contingency funds hidden in the estimate for various reasons, including to protect against deletion by others. Hiding or concealing contingency in a cost estimate is a form of deceit and is a practice that is expressly discouraged.

**CAD Services** Professional drawings and plans generated by computer-aided drafting and design (CAD) systems.

**Change Control** The specified procedures that must be followed to change the baseline estimate. Any impacts to any elements of the baseline scope, cost, and/or schedule are identified as changes to the baseline and are processed through a highly structured and specific procedure called change control.

**Check Estimate** A second estimate normally prepared by a source that is independent of the original source, using identical information and scope as provided to the original source, and used to verify the validity of the first estimate. Occasionally, the original source should develop a second estimate using different methodology to serve as a sanity check against the original estimate.

**Code of Accounts** Coordination and structure for construction cost accounting based on an interrelationship of place, trade, function, or material.

A Code of Accounts is designed to be a sequentially structured collection of costs used within a specific business entity or site-specific in performance measurement systems for comparison of the planned elements of cost contained in the estimate against the final actual costs incurred for identical activities. The Code of Accounts greatly facilitates an equalized comparison for planned costs against actual costs.



The Code of Accounts also provides a common structure for cost collection in a database format for use in developing future estimates for other similar activities or elements of cost that are unique to a specific site or business entity.

**Composite Price Index** An index that globally measures the price change of a range of commodities. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Federal statute (also known as Superfund) enacted in 1980 and reauthorized in 1986, that provides the statutory authority for cleanup of hazardous substances that could endanger public health, welfare, or the environment.

**Conceptual Design Estimate** (also called a conceptual estimate) An estimate prepared from early or initial designs or program source documents. A conceptual estimate is utilized to develop project or program funding requirements.

**Conceptual Design Report** The CDR is a document that describes the project in sufficient detail to produce a budget cost estimate and to evaluate the merits of the project. A conceptual design report shall be prepared for line construction projects prior to inclusion of the project in the DOE budget process.

**Contingency** An amount designated to cover unrecognized future changes that may result from incomplete design, unforeseen and unpredictable conditions, or uncertainties. The amount of the contingency will depend on the status of the design, procurement, construction, and the complexity and uncertainty of the component parts of the project. Contingency is not to be used to avoid making an accurate assessment of expected costs.

**Construction Equipment** Costs associated with direct purchase or rental of major tools and equipment that are not normally supplied by the craftsmen but necessary to perform construction activities in the fulfillment of contractual obligations, as established by industry standards using the most cost-efficient methods reasonably available.

**Construction Equipment Maintenance** Costs to maintain and/or store major pieces of equipment or tools used during construction.

**Construction Facilities** Temporary structures, enclosures, buildings, roads, site accessibility applications, and other costs required to support the performance of the project activities. Temporary construction facilities include temporary toilet facilities/treatment plants, temporary walkways, temporary office trailers/structures, changing rooms, contamination huts/tents, asbestos containments, special shipment rail-lines, temporary warehousing, tool sheds, guard shacks, and any other supportive structures or utilities necessary for the completion of the project. Construction facilities shall consist only of facilities both erected/installed and removed during the duration of the project and must be itemized in the estimate.

Facilities that remain in place or use after completion of construction are not considered construction facilities (e.g., permanent plant construction, site work, operating expense).

**Consumables** Expendable supplies and materials used during construction. Includes utilities, fuels and lubricants, welding supplies, workers' supplies, medical supplies, rope, tarps, drill bits, grinding wheels, gloves, hoses, rags, and soap.



**Contingency** An amount added to the estimate to allow for the unforeseen that experience shows will likely be required. This may be derived either through statistical analysis of past project costs or by applying experience gained on similar projects. Contingency does not include changes in scope or unforeseeable major events, such as strikes or earthquakes.

A quantified risk analysis aid can be used in developing and assessing contingency, through a factored adjustment, to determine additional costs that may result from incomplete design, unforeseeable impacts to cost, and unpredictable conditions or uncertainties within the defined scope or project. The amount of the contingency will depend on the status of design, procurement, and construction and the complexity and uncertainty of the component parts of the project. Contingency should not be used to avoid making an accurate assessment of expected cost.

Appropriate application of contingency is particularly important when previous experience relating estimates and actual costs have shown that unforeseeable events that will increase costs are likely to occur.

For estimating purposes, contingency includes management reserve budgets unless specifically noted otherwise in the project estimate. Contingency may include costs for escalation but must be noted to all affected project team participants and documented accordingly.

**Contract** A legally binding enforceable agreement, written or verbal, between two or more parties. Following are descriptions of several types of contracts used in construction:

- **Fixed Price** Fixed-price contracts are ones wherein a contractor agrees to furnish services and material at a specified price, possibly with a mutually agreed-upon escalation clause. This type of contract is most often employed when the scope of services to be provided is well defined.
- **Fixed Price–Lump Sum**: The contractor agrees to perform all services as specified by the contract for a fixed amount. A variation of this type may include a turnkey arrangement where the contractor guarantees quality, quantity, and yield on a process plant or other installation.
- **Unit Price**: The contractor will be paid at an agreed-upon unit rate for services performed. For example, technical work-hours will be paid for at the unit price agreed upon. Often fieldwork is assigned to a subcontractor by the prime contractor on a unit price basis.

**Cost (Control) Account** The account at the lowest level of the project's work breakdown structure for which individual costs are summarized and accounted.

- **Cost Reimbursement** In cost-plus contracts, the contractor agrees to furnish to the client services and material at actual cost, plus an agreed-upon fee for these services. This type of contract is employed most often when the scope of services to be provided is not well defined.



- **Cost Plus Fixed Fee:** The client pays costs as defined in the contract document. Burden on reimbursable technical labor cost is considered, in this case, part of cost. In addition to the costs and burden, the client also pays a fixed amount as the contractor's "fee."
- **Cost Plus Fixed Sum:** The client will pay costs defined by contract plus a fixed sum that will cover "nonreimbursable" costs and provide for a fee. This type of contract is used in lieu of a cost-plus-fixed-fee contract where the client wishes to have the contractor assume some cost plus percentage fee of the risk for items that would be reimbursable under a cost-plus-fixed-fee contract.
- **Cost Plus Percentage Burden and Fee:** The client will pay all costs as defined in the terms of the contract plus "burden and fee" at a specified percent of the labor costs that the client is paying for directly. This type of contract generally is used for engineering services. In contracts with some governmental agencies, burden items are included in indirect cost.
- **Cost Plus Percentage Fee:** The client pays all costs plus a percentage for the use of the contractor's organization.
- **Guarantee and Target Price/Guaranteed Maximum or Target Price** A contractor agrees to perform all services as defined in the contract document guaranteeing that the total cost to the client will not exceed a stipulated maximum figure. Quite often, these types of contracts will contain special share-of-the-savings arrangements to provide incentive to the contractor to minimize costs below the stipulated maximum.
- **Incentivized/Cost Plus Award Fee or Cost Plus Incentive Fee** A special contractual arrangement usually between a client and a contractor wherein the contractor is guaranteed a bonus (fee), usually a fixed or percentage sum of money, for completion of the project ahead of a specified schedule and/or below a specified cost.

**Contract Price** The monies payable by the owner to the contractor under the contract documents as stated in the agreement.

**Cost Estimate** A report intended to be a reliable and dependable forecast of costs that are expected to be incurred during the performance of an activity, such as a project or program.

**Cost Estimation** The determination of quantity and the predicting or forecasting, within a defined scope, of the costs required to construct and equip a facility, to manufacture goods, or to furnish a service. Costs are determined utilizing experience and calculating and forecasting the future cost of resources, methods, and management within a scheduled time frame. Included in these costs are assessments and an evaluation of risks and uncertainties. Cost estimation provides a basis for feasibility studies, business planning, budget preparation, and cost and schedule control.

**Cost Index (Price Index)** A number that relates the cost of an item at a specific time to the corresponding cost at some arbitrarily specified time in the past. A cost index is useful in taking known past costs for an item and relating them to the present.



**Critical Decision** A formal determination at a specific point in a project that allows the project to proceed. Critical decisions occur in the course of a project, for example: prior to commencement of conceptual design, commencement of execution and prior to turnover.

**Current Dollars** Dollars of purchasing power in which actual prices are stated, including inflation or deflation. In the absence of inflation or deflation, current dollars equal constant dollars.

**Davis-Bacon Wage Rates** Wage rates issued and administered as a result of the Davis-Bacon Act, usually performed by state agencies that regulate the minimum wage rates paid to employees on federally funded projects. These are the minimum wage rates allowable on federally funded projects and quite often are the same as the local union rates.

**Decommissioning** The process of removing a facility from operation, followed by decontamination, entombment, dismantlement, or conversion to another use.

**Decontamination** The removal of hazardous material (typically radioactive or chemical material) from facilities, soils, or equipment by washing, chemical action, mechanical cleaning, or other techniques.

**Deliverable** A report or product of one or more tasks that satisfies one or more objectives and must be delivered to satisfy contractual requirements.

**Definitive Estimate** An estimate conducted during the latter stages of a project when engineering may be as much as 90% complete. The actual cost should ultimately be within plus 10% to minus 5% of the definitive estimate.

**Depreciation** (1) Decline in value of a capitalized asset; (2) A form of capital recovery applicable to a property with a life span of more than 1 year, in which an appropriate portion of the asset's value is periodically charged to current operations.

**Detailed Estimate** This estimate is developed for the total project based on the completed design package. This estimate is used to verify the contractor's figures in both a lump sum or negotiated fee project. It is also used to track costs during the construction phase of the contract.

**Direct Costs** Any cost that can be specifically identified with a particular activity, project, or program including wages, salaries, travel, equipment, materials, and supplies directly benefitting the project or activity. The direct costs include all costs identified as direct materials, direct labor, and direct expenses. In manufacturing, service, and other nonconstruction industries, direct costs include the portion of operating costs that are generally assignable to a specific product or process area, including such items as input materials, payroll, and benefits, maintenance, utilities, chemicals and operating supplies, royalties, services, and packaging.

**Direct Expense** All items of expense directly incurred by or attributable to a specific project. Direct expenses include the costs of furnishing, using, and maintaining construction and other project-specific equipment. Direct expenses also include costs associated with general site conditions, temporary construction, permits, fees, subcontractor costs, and all site-specific



construction service support contracts and activities. Other types of direct expenses are those costs included in the estimate for insurance, escalation, and contingency, as is readily allocable to a specific site.

Direct expenses are usually associated with a specific site and are generally not applied as costs against other sites or independent geographical locations.

**Direct Labor** Those elements of cost that define or make up the detail of the estimated project labor. The direct cost includes only non-indirect specific-task-oriented direct labor costs for temporary or permanent construction activities. Direct labor includes costs of base wage rates, estimated wage rates, project staffing salaries, direct field supervision adjustments to the craftsmen wage rates, crew mixes, project-specific factors and adjustments to the estimated labor costs, labor burden and fringe, and craft support. Project staffing includes program and project management, design, and all construction management teams and support personnel.

**Direct Materials** Those elements of cost that define or make up the detail of the estimated project materials. The direct cost includes only specific material costs exclusive of markups. Direct material costs include specific material products furnished with the intent of being temporarily or permanently incorporated into the project facilities or structures and any associated taxes or delivery and unloading costs.

**Disposal** The process used to document, physically remove from a site, relocate to a permanent or interim storage location, including the permanent transfer of ownership or the disposed items.

**Element of Cost** The individual components or parts of the estimate that when added together comprise the total estimated cost. An element of cost is an individual itemized line item documented in the project estimate and consists of cost-specific, itemized, direct-cost items or associated itemized markups.

An element of cost usually contains costs broken down by material, labor, and construction equipment. Elements of cost are defined more extensively than are unit rates.

**Engineering, Design, and Inspection (ED&I)** The design phase of a project or program supporting construction activities including construction modifications and inspections, that occur after the design is essentially complete and ready for construction (field) use. ED&I cost estimates consist more specifically of the design overview and management activities as identified in a task analysis prepared by engineering staff to provide design service contractor overview, project engineering management, functional design reviews, and technical and administrative function.

**Environmental, Safety and Health (ES&H)** An organization that is responsible to identify general and project specific regulatory requirements and responsible to fully implement those environmental, safety, and health regulations or requirements.

**Escalation** The provision in estimated costs for an increase in costs due to continuing price-level changes over time.



Escalation is an increase in the amount of labor hours required to produce a given unit of work output, aggregate demand exceeding aggregate supply, external pressures on the market such as droughts or cartels, wage-price spiral, an increase in the cost of labor, the costs of living, or a decrease in the availability of goods or services. These factors independently or in unison can impact the cost of all goods or services.

The elements of cost should not contain escalation at the detail level unless specifically noted in the estimate item. Escalation should be applied to labor costs at a different (lower) rate than the rate applied to material costs if the labor rates are more current than material prices.

**Estimate, Cost** An evaluation of all the costs of the elements of a project or effort as defined by an agreed-upon scope. Three specific types of estimates based on degree of definition are as follows:

1. **Order-of-Magnitude Estimate**—an estimate made without detailed engineering data. Some examples are an estimate from cost capacity curves, an estimate using scale-up or -down factors, and an approximate ratio estimate. It is normally expected that an estimate of this type would be accurate within plus 50% to minus 30%.
2. **Budget Estimate**—budget in this case applies to the owner's budget and not to the budget as a project control document. A budget estimate is prepared with the use of flow sheets, layouts, and equipment details. An estimate of this type would normally be accurate within plus 30% to minus 15%.
3. **Definitive Estimate**—as the name implies, an estimate prepared from very defined engineering data. The engineering data include, as a minimum, nearly complete plot plans and elevations, piping and instrument diagrams, one-line electrical diagrams, equipment data sheets and quotations, structural sketches, soil data and sketches of major foundations, building sketches, and a complete set of specifications. The maximum definitive estimate is derived from "approved for construction" drawings and specifications. An estimate of this type would normally be accurate within plus 15% to minus 5%.

**Estimate Basis Document** A document that states the specific information and assumptions used in the development of the project estimate. Every project estimate should be issued collectively with the estimate basis document.

**Estimate At Complete** A value developed to represent a realistic appraisal of the final cost of a task when accomplished. It is the sum of actual costs-to-date plus the estimate of costs for work remaining (EAC).

**Estimate to Complete** An estimate of costs for the sum of the remaining activities or portions of the project not yet completed. The ETC does not contain any actual costs incurred already for the project.

**Estimating Methodology** A body of methods, rules, and procedures employed for analysis and development of cost estimates.





**Exclusions** Those items mentioned or noted in the supporting project documents but **not** contained in the project estimate. All exclusions are labeled and itemized in the estimate basis document.

**Exempt** Employees exempt from federal wage and hours guidelines.

**Feasibility Study** The objectives of the feasibility study are to identify the alternatives for remediation and to select and describe the alternative that satisfies the applicable or relevant and appropriate requirements for mitigating confirmed environmental contamination. Successful completion of the feasibility study should result in the development of a remedial design to implement the selected remedial actions.

**Fee** A term used to denote payment for professional ability, capability, and availability of an organization and its resources, excluding compensation for direct, indirect, and/or reimbursable expenses. Fee sometimes denotes compensation of any kind, whether in monetary form or not, for services rendered. Fee should be considered by the estimator as synonymous with profit.

Fee is the most negotiable portion of a construction contract. The level of fee is dependent on the amount of cash the contractor must invest in the project (nearly every project or program requires a cash investment by the contractor), the cost of money, resources available to perform the work, the current workload and backlog (supply and demand), and the risks that are imposed on the contractor. Fees can range from 100% for highly technical government service contracts to 0% for a contractor that has zero risk and investment. Normal commercial business profit margins are close to 10% but are more generally based on a return-on-investment for the contractor.

**Field Costs** Indirect costs of engineering and construction associated with the project's field site rather than with the home office.

**Field Labor Overhead** The sum of the cost of payroll burden, temporary construction facilities, consumables, field supervision, and construction tools and equipment.

**Fixed Cost** Those costs independent of short-term variations in output of the system under consideration. Includes such costs as maintenance; plant overhead; and administrative, selling, and research expense. For the purpose of cash flow calculation, depreciation is excluded (except in income tax calculations).

**Forecast** An estimate and prediction of future conditions and events based on information and knowledge available at the time of the forecast.

**Fringe Benefits** Employee welfare benefits (e.g., expenses of employment such as holidays, sick leave, health and welfare benefits, retirement fund, training, and supplemental union benefits).

**Full Time Equivalents (FTE)** A cost or method of identifying units of labor relative to hours. An FTE is the cost that would be incurred for a full year of time of one employee calculated at an average of 52 weeks per year at 40 hours per week, less allowable vacation, holiday, sick



leave, and/or all leaves of absence when the employee receives compensation benefits. An industry accepted standard is 1,872 hours per year.

**Future Dollars** The value of some amount of money at some point in the future.

**General & Administrative (G&A)** See Indirect Costs

**General Conditions** The project-specific site costs consisting of temporary construction, nonmanual field supervision staffing, hot and cold weather protection, permits, and other costs that may be required by the general and special site conditions.

**General Overhead** The fixed cost in operation of a business. General overhead is also associated with office, plant, equipment, and staffing (and expenses thereof) maintained by a contractor for general business operations. The costs of general overhead are not specifically applicable to any given job or project. (See **Overhead**.)

**General Requirements** Distributables and field costs.

**Government Cost Estimate** A government estimate is most frequently used to determine the reasonableness of competitive bids received in connection with fixed-price construction contracts and serves as a control in evaluating cost estimates prepared by a prime cost-type construction contractor.

**HTRW Sites** Projects sites that have been designated in a joint effort by several federal agencies and are determined to contain Hazardous, Toxic, or Radioactive Wastes.

**Independent Cost Estimate** A documented cost estimate that has the express purpose of serving as an analytical tool to validate, cross check, or analyze estimates developed by proponents of a project. An independent cost estimate also serves as a basis for verifying risk assessments.

**Indirect Costs** Incurred by an organization for common or joint objectives and that cannot be reasonably identified or allocated specifically with a particular activity or project. Indirect costs are generally considered to be those costs that are not incurred at any specific site but are incurred against several independent geographic locations.

In an activity-based cost estimate that is based on a performance measurement system, **all** costs should be considered **direct** costs unless it is not feasible to allocate to a specific project/program, or if a reasonable basis cannot be developed to consistently allocate certain costs to a specific project/program.

Indirect costs include all overhead expenses; expenses indirectly incurred and not directly chargeable to a specific project or task, including general and administrative expenses that are applied uniformly to all projects or programs. Examples of indirect costs may include professional and contractors' licenses, human resources, janitorial staff, rent, maintenance, business supplies, general liability/comprehensive insurance coverage, and any other expenses not incurred as a result of a specific project.



An accumulation of indirect costs can be recovered through the application of specified and agreed overhead rates. The overhead rate should be applied uniformly as a percentage factor of the total dollars or may be applied as a lump sum dollar amount if noted accordingly in the estimate basis document.

Escalation and contingency should be itemized separately and, therefore, should not be included or built into the project overhead.

**Job Conditions Factors** The application of various factors deviating from and adjusting the standardized labor productivity factors. Job conditions factors should include factors for congestion, potential for exposure to friable asbestos, weather conditions for outdoor work, or other project-specific estimating factors.

Job conditions adjustment or factors should be applied as a percentage factor used to decrease or increase the standard labor productivity factor.

**Job Overhead** The expense of such items as trailers, toilets, telephone, superintendent, transportation, temporary heat, testing, power, water, cleanup, and similar items possibly including bond and insurance associated with the particular project.

**Labor Burden** Costs for worker's compensation insurance, employer-paid Social Security tax, state and federal unemployment insurance, union and/or company fringe benefits, and subsistence. (see also "Labor Fringes & Payroll Taxes")

**Labor Cost** The base salary and labor burden costs associated with labor that can be definitely assigned to one item of work, product, process area, or cost center.

**Labor Fringes & Payroll Taxes** (also known as labor burden) The costs associated with craft (manual labor/workers) for health and welfare, pension, Social Security and Medicare, state unemployment insurance, federal unemployment insurance, and worker's compensation as required by law.

**Labor (Wage) Rates** The cost associated with the appropriate hourly wage rate for the (non manual/professional) staff or (manual labor) craftsman/worker planned to perform a task and should be expressed in terms of a monetary cost per hour. The labor rate is only a representation of the average rate for the identified position of employment intended to accomplish the task. All craft rates used in the estimate shall be as provided in the current issue of the Davis-Bacon General Decision and weighed as a percentage of a total crew effort.

Labor rates must include costs, when specifically required employer policy, for allowances such as educational advancement, hardship, cost of living differential, relocation, and subsistence. These costs should be included as a percentage of wage rates based on project-specific conditions or based on past practices of the employer. Labor rates should not automatically include (without basis) any costs for special pay, retroactive pay, severance pay, overtime, or premium pay, unless specifically noted otherwise in the estimate.

Escalation and contingency must be itemized separately and not be included or built into the labor rate.



**Learning Curve** A planning technique particularly useful in project-oriented industries where new products are frequently phased in. The basis for the learning curve calculation and graphic representation is the demonstration that workers will be able to produce the product more quickly after they get used to making it. The learning curve is presented as a graphic representation of the progress in production effectiveness as time passes.

**Level of Effort** Support effort (e.g., vendor liaison) that does not readily lend itself to measurement of discrete accomplishment. It is generally characterized by a uniform rate of activity over a specific period of time.

**Life-Cycle Cost** An economic assessment of an item, area, system, or facility that considers all the significant costs of ownership over its entire economic life and is expressed in terms of equivalent dollars. Life-cycle costing includes elements of cost, when applicable, for investment costs (return on investment), escalation, operations, maintenance, spare parts, energy use, salvage value, tax elements, alteration/demolition/replacement costs, and other costs.

Life-cycle cost is the sum total of all direct, indirect, recurring, nonrecurring, and other related costs incurred or estimated to be incurred in the design, development, production, operation, maintenance, support, and final disposition of a major system over its anticipated useful life span.

Refurbishment and restoration costs should be included in a life-cycle cost estimate if existing sites or facilities are used. For further information concerning life-cycle costing, refer to American Society for Testing and Materials (ASTM) guides E 1185-87 and E 1369-90; ASTM practices E 917-89, E 984-89, E 1057-85, E 1074-91, and E 1121-86; and ASTM terminology E833-91a.

**Life-Cycle Cost Analysis** An analysis of the direct, indirect, recurring, nonrecurring, and other related costs incurred or estimated to be incurred in the design, development, production, operation, maintenance, support, and final disposition of a major system over its anticipated useful life span.

**Location Factor** An estimating factor used to convert the cost of an identical plant from one location to another. This factor takes into consideration the impact of climatic conditions, local infrastructure, local soil conditions, safety and environmental regulations, taxation and insurance regulations, labor availability, and productivity.

**Lump Sum** The complete in-place cost of a system, a subsystem, a particular item, or an entire project. Lump-sum contracts imply that no additional charges or costs will be assessed against the owner.

**Maintenance** The cost for labor and materials that may be necessary to maintain equipment or other installations in suitably operable condition. Life cycle costs include maintenance costs for items that cannot be expended within the year purchased and that are considered to be fixed capital items.

**Market Value** The monetary price upon which a willing buyer and a willing seller in a free



market will agree to exchange ownership, both parties knowing all the material facts but neither being compelled to act. The market value fluctuates with the degree of willingness of the buyer and seller and with the conditions of the sale. The use of the term “market” suggests the idea of barter. When numerous sales occur on the market, the result is to establish fairly definite market prices as the basis of exchanges.

**Markup** As variously used in construction estimating, such percentage applications as general overhead, profit, and other indirect costs. When markup is applied to the bottom of a bid sheet for a particular item, system, or other construction price, any or all of these indirect costs may be included, depending on local practice.

**Material Cost** The cost of everything of a substantial nature that is essential to the construction or operation of a facility, of both a direct and an indirect nature. Generally includes all manufactured equipment as a basic part.

**Milestone** An important or critical event and/or activity that must occur in the project cycle to achieve the project's objective(s).

**Most Likely (Time) Estimate** The most realistic estimate of the time an activity might consume.

**National Environmental Policy Act (NEPA) of 1969** This act established the requirement for conducting environmental reviews of federally funded projects or programs that may adversely impact the human environment. NEPA requires that federal agencies perform an environment review, with public participation, of any proposed major federal actions that may have an impact on the human environment. This review usually results in an Environmental Assessment (EA) or Environmental Impact Statement (EIS). NEPA costs must be forecasted, assessed, and included in the total project cost (TPC) for each specific EA and EIS performed.

**Nonexempt** Employees not exempt from federal wage and hours guidelines.

**Operating Cost** The expenses incurred during the normal operation of a facility, or component, including labor, materials, utilities, and other related costs. Includes all fuel, lubricants, and normally scheduled part changes in order to keep a subsystem, system, particular item, or entire project functioning. Operating costs may also include general building maintenance, cleaning services, taxes, and similar items.

**Operations and Maintenance** Costs associated with the activities required to maintain the effectiveness of response actions will be considered life-cycle costs.

**Optimistic (Time) Estimate** The minimum time in which the activity can be completed if everything goes exceptionally well. It is generally held that an activity would have no more than one chance in a hundred of being completed within this time.

**Order-of-Magnitude Estimate** A methodology used to develop a cost estimate for use in comparing estimates at varying stages of a project or program. The function of an order-of-magnitude estimate is usually to determine the feasibility of proceeding with a certain project or to evaluate alternative designs.



**Other Direct Costs (ODCs)** All costs incurred in a project that are contained in the total estimated cost and are not contained elsewhere in the work breakdown structure.

**Other Project Costs (OPCs)** All costs related to a project that are not included in the Total Estimated Costs, such as supporting research and development, pre-authorization costs prior to start of design, environmental documentation and permits prior to design, plant support costs during construction, activation, facility or process start up and training, one-time costs, and spare parts.

**Overhead** A cost or expense inherent in performing an operation (i.e., engineering, construction, operating, or manufacturing) that cannot be charged to (or identified with) a part of the work, product, or asset and which, therefore, must either be allocated on some arbitrary basis believed to be equitable, or handled as a business expense independent of the volume of production.

**Parametric Estimate** A methodology used to develop an estimate that is based on elements of cost extracted or gleaned from historical data acquired from similar systems or subsystems. Statistical analysis is performed on the historical data to find correlations between cost drivers and other system parameters, such as design or performance. The analysis produces cost equations or cost estimating relationships that can be used individually as elements of cost or grouped into more complex models representing units of cost.

**Payroll Burden** (also referred to as labor burden) Includes all payroll taxes, payroll insurance, fringe benefits, and living and transportation allowances.

**Performance Baseline** The time-phased budget plan against which performance is measured. It is formed by the budgets assigned to scheduled work elements and the applicable indirect budgets.

**Personal Protective Equipment (PPE)** Costs incurred for protective gear and personal equipment provided for and on behalf of each worker assigned hazardous duties or work in hazardous conditions.

**Pessimistic (Time) Estimate** The maximum time required for an activity under adverse conditions. It is generally held that an activity would have no more than one chance in a hundred of exceeding this amount of time.



**Planning Estimate** A type of cost estimate utilized for only feasibility planning and budgeting purposes. Planning estimates are developed for each project or program and are utilized to initiate a specific technical direction or design for a project.

**Plant and Capital Equipment (PACE) Fund** For conventional construction projects, this is a fund which provides for the plant and its basic equipment/furnishings.

**Preliminary Assessment/Site Investigation (PA/SI)** One of the first steps in remediating a site. The PA/SI is designed to evaluate all known information about the site and to conduct a preliminary investigation of the extent and nature of the contamination at the site. The purpose is to determine if further action or investigation is appropriate.

**Preliminary Estimate** The cost estimate for major projects must be prepared in several steps by the estimator. The first run through an estimate can many times be a “quick-and-dirty” estimate utilized by a senior-level professional estimator to determine the “general direction” or status of the development of a cost estimate.

The preliminary estimate is thought of in terms of the development level of an estimate and should not be confused with an estimate based on the level of design. A preliminary estimate can be performed at any level of design and is the “first cut” of any type of estimate that precedes the draft version or final version of the estimate.

**Preliminary Safety Analysis Report (PSAR)** For most major projects above \$50 million, a preliminary safety analysis report is prepared and approved before construction starts. The PSAR is used to identify and analyze potential project safety concerns and impose safety requirements.

**Price** The amount of money asked or given for a product (i.e., the exchange value). The chief function of price is to ration the existing supply among prospective buyers. Price incorporates direct costs, indirect costs, general overhead, profit, and contingency.

**Pricing** The observation and recording (collecting) of prices of commodities.

**Productivity** A relative measure of labor efficiency, either good or bad, when compared to an established base or norm as determined from an area of great experience. Alternatively, productivity is defined as the reciprocal of the labor factor.

**Program** An organized set of activities directed toward a common purpose or goal and undertaken or proposed to support an assigned mission area. A program is characterized by a strategy for accomplishing a definite objective(s), which identifies the means of accomplishment, particularly in quantitative terms, with respect to manpower, material, and facilities requirements. Programs are typically made up of technology base activities, projects, and supporting operations.

**Program Management** Headquarters functions that include planning and developing the overall program; establishing broad priorities; providing program direction; preparing and defending the budget; controlling DOE Headquarters-level milestones; integrating all components of the program; providing public and private sector policy liaison; expediting



Headquarters interface activities and follow-up actions; and retaining overall accountability for program success. Field functions include implementing these program activities, controlling field-level milestones, and providing major support to the Headquarters programming and budget processes. Management responsibility and authority for specific projects will normally be delegated by the Cognizant Secretarial Officer.

**Program Manager** An individual in an organization or activity who is responsible for management of a specific function or functions related to program management.

**Project** A unique effort within a program that has firmly scheduled beginning, intermediate, and ending date milestones; prescribed performance requirements; prescribed costs; and intense management, planning, and control. The project is the basic building block in relation to a program that is individually planned, approved, and managed.

**Project Closeout** The final phase of a project where all project contracts are closed and all records are finalized for storage and eventual retrieval by the Internal Revenue Service.

**Project Cost** Total cost of the project, including construction cost, professional compensation, land costs, furnishings and equipment, financing, and other charges.

**Project Management Plan (PMP)** The Project Management Plan is the document which sets forth the plans, organization, and systems that those responsible for managing the project shall utilize. The content and extent of detail of the PMP will vary in accordance with the size and type of project and status of project execution.

**Project Manager** An individual assigned responsibility and authority for successfully accomplishing the goals of a project. The project manager is responsible for planning, controlling, reporting, and managing the project effort.

**Projectizing** Identifying an individual or group of similar and/or associated activities that have a defined scope, schedule, and cost supporting a defined end-state.

**Quality Assurance** All planned and systematic action necessary to provide adequate confidence that a facility, structure, system, or component will perform satisfactorily in service.

**Quality Control** All actions necessary, including site construction engineering and inspections, to control and verify features and characteristics of a material, process, product, or service to specified requirements. Quality control is the process through which actual quality performance is measured and compared with standards.

**Quantity Survey** Using standard methods measuring all labor and material required for a specific building or structure and itemizing these detailed quantities in a book or bill of quantities.

**Range of Accuracy or Probable Contingency** A term used to imply the comparison of estimate costs to actual costs incurred under realistic conditions and the employment of qualified supervision and experienced craftsmen. This term is not intended to imply the comparison of one estimate with other estimates that were prepared and submitted on a





competitive basis.

**Remedial Action** A subactivity (CERCLA term) in a remedial response involving actual implementation, following remedial design, of the selected source control and /or off-site remedial effort.

**Remedial Design** The final design specifications and drawings are developed for remediation work. All engineering required to perform the remediation is complete.

**Remedial Investigation (RI)** The Comprehensive Environmental Response, Compensation, and Liability Act process of determining the extent of hazardous substance contamination and, as appropriate, conducting treatability investigations. The RI is often done in conjunction with the Feasibility Study.

**Resource Conservation and Recovery Act (RCRA)** A congressional mandate that requires the management of regulated hazardous waste and requires that permits be obtained for government facilities that treat, store, or dispose of hazardous waste. RCRA establishes standards for these facilities and requires corrective actions (e.g., remediation) of past releases of hazardous waste from regulated waste management units.

**Risk** The degree of dispersion or variability around the expected or “best” value that is estimated to exist for the economic variable in question (e.g., a quantitative measure of the upper and lower limits that are considered reasonable for the factor being estimated).

**Risk Analysis** Estimate of the probability of loss from some hazard, contingency or circumstance. Commonly used to signify the estimate of liability occurring as a result of loss or activity involving nonrecovery of cost and fee.

**Scope** The equipment and materials to be provided and the work to be done. Scope is documented by the contract parameters for a project to which the company is committed.

**Scope of Work** The project description, as provided by the project manager, that describes and defines the project in a manner sufficiently to enable the project estimator to develop a reasonable estimate of costs. The scope of work is a project-specific document that should summarily support and fully control the project estimate of cost. There should never be any discrepancies between the scope of work document and the project estimate.

**Site Inspection** The purpose of the site inspection is to acquire the necessary data to confirm the existence of environmental contamination at identified potential sites and to assess the associated potential risk to human health, welfare, and the environment.

**Stakeholder** Those persons and/or groups of people and organizations who are affected or perceive that they are affected by the DOE programs. Stakeholders include DOE management and employees (internal) and executive, legislative, and regulatory groups; public representatives; the general public; intervening groups; special interest groups; contractors; suppliers; and universities (external).

**Standard Labor Productivity Factor** A standard factor used to determine the quantity a



single working unit can produce in a specified period of time. The standard labor productivity factor is used to multiply the quantity of a given element of cost against the labor rate to determine the labor cost.

All estimates are factored based on a specified unit per work-hour unless noted otherwise in the estimate. The standard labor productivity factor is the rate as determined in Means, Richardson, or other estimating standards, exclusive of such adjustments as craft support, supervision, unusual job conditions, or any other factors or markups.

Contingency is itemized separately and is not to be included in or built into the labor productivity factor.

**Superfund Amendments and Reauthorization Act (SARA)** The 1987 Act amending and reauthorizing CERCLA for responding to hazardous waste sites and increasing the size of the fund.

**Systems Engineering Approach** The synthetic mode of thought applied to systems problems. A way of thinking that involves a series of steps accomplished in a logical manner and directed toward the development of an effective and efficient product or system.

**Take-Off** Measuring and listing from drawings the quantities of materials required in order to price their cost of supply and installation in an estimate and to proceed with procurement of the materials.

**Time Sensitive** A term applied to those elements of cost that will be expended or incurred on a time-unit basis (monthly, weekly, hourly, etc.) and that are a subset of indirect costs. A cost engineer's salary on a project is a time-sensitive cost as long as that engineer is on the project.

**Title I Design** The preliminary stage of project design. In this phase, the design criteria are defined in greater detail to permit the design process to proceed with the development of alternate concepts and a Title I design Summary, if required.

**Title II Design** An intermediate estimate used to verify that the Title I design details still remain within the project funding.

**Title III Design** The definitive stage of project design. The approved Title I concept and the supporting documentation prepared for the Title I forms the basis of all activity in Title II. Definitive design includes any drawings, specifications, bidding documents, cost estimates, and coordination with all parties which might affect the project; development of firm construction and procurement schedules; and assistance in analyzing proposals or bids.

**Total Estimated Cost (TEC)** An estimate performed during any stage of a project, consisting of the total forecast cost of a contracted effort. A TEC does not include the total cost of the entire project or program as contrasted by the TPC. Total Estimated Cost is the construction costs of the project, includes direct and indirect construction costs and initial equipment necessary for startup of operations, and may include the forecasted costs for land and land rights, engineering/design.



**Total Project Cost (TPC)** The TPC is the total monetary funding of an entire project effort. The TPC includes the Design/Engineering effort; preplanning and planning costs; life cycle costs including facility operational and maintenance costs; and all costs elements of the TEC. The TPC consists of all costs specific to a project incurred prior to startup of facility operation, all research and development costs, operating costs, and capital equipment costs as specifically associated with a facility or process.

**Uncertainty** Unknown future events that cannot be predicted quantitatively within useful limits (e.g., accidents that destroy invested facilities, a major strike, or a competitor's innovation that makes the new product obsolete).

**Unit Cost** A collection or assembly of costs, usually used at the conceptual level of estimate, determined by the makeup of a collection of several detailed elements of cost assembled together.

**Unit Prices** Cost per unit of measurement for materials or services.

**Variable Costs** Those costs that are a function of production (e.g., raw materials costs and by-product credits) and those processing costs that vary with plant output (such as utilities, catalysts and chemicals, packaging, and labor for batch operations).

**Wage Rates** See **Labor (Wage) Rates**.

**Work Breakdown Structure** A product-oriented matrix that organizes, defines, and graphically displays all work elements of a project in an organized and structured code framework developed for performance measurement reporting. Separate work breakdown structure elements should be utilized whenever possible for differing functional organizations and resources.



# Appendix A: Cost-Estimating Terms and Definitions